The Johnson Space Center's Engineering Directorate has led the way in designing, developing, and testing all U.S. human spacecraft since the Center opened for business in 1961.

Center engineers work with all human spacecraft functions including: life support systems; orbital propulsion; crew equipment, guidance, navigation, and control; electrical power generation and distribution; cooling systems; structures; flight software; spacesuits and spacewalking equipment; and robotics. Engineering support is also provided to the Space Shuttle, International Space Station, and advanced spacecraft development.

Some of the engineering research and development projects under way at Johnson Space Center include: the design, development, and testing of a prototype crew return "lifeboat" for the International Space Station (the X-38); the development and testing of advanced life support systems that combine plants with high technology to fully recycle air, water, and food; and the development of a humanlike, two-handed, 10-fingered robot that may soon drastically reduce the amount of spacewalking required by astronauts for maintenance.

In addition, experts at the Center are researching many of today's leading technological developments, from revolutionary carbon nanotubes, which are potentially 100 times stronger than yet one-sixth the weight of steel, to advanced electricity-generating fuel cells.

Avionic Systems Anyone who's ever seen the electronic glow of a Space Shuttle crew cabin can only imagine the complex hardware and software that goes into making the displays and control panels. We engineer the core electronic and software systems that implement systems management, command, guidance, navigation, flight control, communications, tracking, instrumentation, and data services for the Space Shuttle. We're also responsible for overall avionics systems engineering design and integration for all of the Space Shuttle's avionics subsystems.

Energy Systems There's more to us than solar panels and batteries. Energy Systems provides engineering expertise for fluid systems, electromechanical actuation, resource utilization, pyrotechnics, power generation, energy storage, power distribution, and control systems. We also maintain two facilities that provide environmental test services that use state-of-the-art instrumentation and innovative designs to measure performance over a wide variety of interface and environmental conditions.

Crew and Thermal Systems Is it hot in here, or is it just unforgiving radiation? Crew and Thermal Systems designs, develops, and tests the technologies and provides the technical expertise for NASA's flight programs in the areas of environmental control and life support systems, active thermal control systems, crew equipment, spacesuits, and habitat systems such as crew quarters and galley equipment for zero-gravity and planetary environments.

Automation, Robotics, Virtual-Reality Been looking for a robot? Automation, Robotics, and Virtual Reality will design a robot of any shape and size to assist spaceflight crewmembers in performing various tasks and to develop high-tech simulation technology. We also design, develop, verify, integrate, and maintain intelligent systems, robotics systems, real-time and virtual-reality simulations, and crew training facilities for programs assigned to the Johnson Space Center. We operate five major facilities – including Intelligent Systems Technology, Management of Flight Robotic and Intelligent Systems, Robotic Systems Technology, Systems Design and Test, and Simulation Graphics and Analysis – and seven laboratories.

Biomedical Systems Are you more interested in the human element than the mechanical? We're responsible for everything from design to flight hardware processing and integration of biomedical instrumentation devices, systems, and supporting equipment. By developing projects, hardware, and payloads, we support crew biomedical health, countermeasure requirements, and human life sciences experiments.

Structural Engineering Do you like to design or make things? Or do you enjoy testing the limits of what things are made of? This is the place for you. We develop, evaluate, and manufacture structural, mechanical, and thermal designs using the latest techniques and tools. Not only are we responsible for design and fabrication, but we have state-of-the-art laboratories in which we test, under a full range of flight conditions, everything from space vehicles to space modules and mechanical systems as well as hardware. After the tests, our engineers evaluate and select the materials as well as conduct failure analyses, test stress limits, and test reactions in spacecraft.

Aeroscience and Flight Mechanics Have you ever dreamed of a building a better spacecraft? We specialize in the space engineering disciplines of aerodynamics, aerothermodynamics, guidance, navigation, control, and flight performance. Our engineers are involved with all phases of spaceflight vehicle development and with operating spacecraft of all types. We support five major labs at Johnson Space Center: the Guidance, Navigation and Control Rapid Development Laboratory; the Flight Control Laboratory; the Flight Mechanics Laboratory; the Aeroscience and Computational Fluid Dynamics Laboratory; and the Navigation Systems and Technology Laboratory.

Advanced Development Are you interested in designing concepts and analyses for advanced spacecraft and missions? Our engineers and scientists develop the strategies for human exploration and development of space, including evaluating alternative mission strategies. We integrate the technology development necessary for human spaceflight across the Engineering Directorate, and we coordinate NASA's Human Exploration and Development of Space Enterprise.

Typical Degrees Aerospace, Mechanical, Computer, Electrical, Structural, Materials, and other Engineering degrees

Since opening in 1964, the Center has managed the design, development and testing of all U.S. human spacecraft from Apollo to the International Space Station.